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One of the major issues for the use of electric propulsion thrusters is lifet ime. Missions analyses est imate that for electric propulsion to be a viable option, thruster lifetimes must be of the order of 1 O(X) to 15,000 hours. Cathode erosion, one of the primary life-limiting mechanisms, has been shown to depend strongly on the cathode temperature. Therefore, part of this study is intended to provide a simple means of predicting the cathode temperature for various thruster operating conditions. in addit ion, the thermal characterist ics of the electrodes must be known to compute the overall thruster thermal loads to the spacecraft. This mode] also provides the appropriate boundary credit ions at the cathode surface for models of the operating characterist ics of the thruster. For example, the current contours within the magnetoplasm adynamic (MPD) thruster cannot be specified independent 1 y of the cathode temperat ure di stribut ion because the major-it y of the current is from thermionic emission. Since the cathode model boundary conditions also depend on the characteristics of the main plasma, the two models must be ultimately coupled to obtain an overall model of the cathode region of the thruster.

This paper will compare theoretical predictions of the temperature distribut ions with experimental data for both high pressure and low pressure discharges. in addition, comparisons will be made for different gas types.